



CHANDLER MUNICIPAL AIRPORT
AIRPORT MASTER PLAN

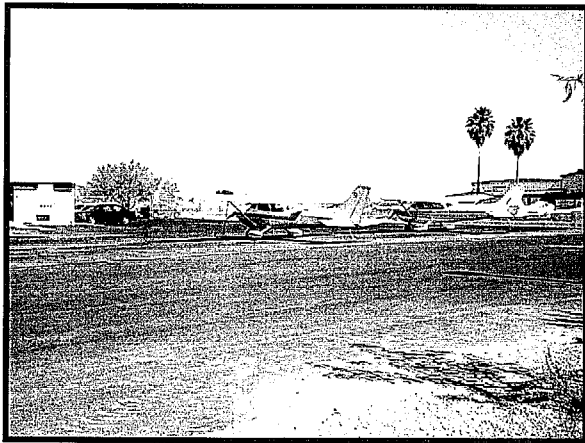
Chapter Four

DEVELOPMENT ALTERNATIVES

DEVELOPMENT ALTERNATIVES



CHANDLER
MUNICIPAL
AIRPORT



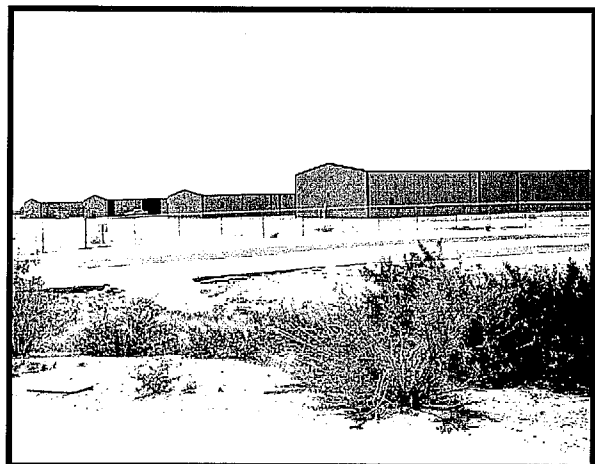
In the previous chapter, airside and landside facilities required to satisfy the demand for the long range planning period were identified. The next step in the planning process is to evaluate the reasonable ways these facilities can be provided. There are countless combinations of options, but the alternatives presented are those with the greatest potential for implementation.

Any development proposed for a master plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next twenty years. However, no plan of action should be developed which may be inconsistent

with the future goals and objectives of the City of Chandler and its citizens who have a vested interest in the development and operation of the airport.

The development alternatives for Chandler Municipal Airport can be categorized into two functional areas: The **airside** (airfield) and **landside** (general aviation hangars, apron, and terminal area). Within each of these areas, specific facilities are required or desired. In addition, the utilization of the remaining airport property to provide revenue support for the airport and to benefit the economic development and well-being of the Chandler area must be considered.

Each functional area interrelates and affects the development potential of the



others. Therefore, all areas must be examined both individually, then coordinated as a whole to ensure the final plan is functional, efficient, and cost effective. The total impact of all of these factors on the existing airport must be evaluated to determine if the investment in the Chandler Municipal Airport will meet the needs of the citizens of the community both during and beyond the planning period.

When analyzing alternatives for development, consideration must also be given to a "do nothing" or "no build" alternative as well as the possibility of removing aviation services altogether. As these alternatives are not without major impacts and costs to the public, they are also addressed in this chapter.

The alternatives considered are compared using environmental, economic, and aviation factors to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as the input and direction from local government agencies and airport users, a final airport concept can evolve into a realistic development plan.

DO-NOTHING ALTERNATIVE

The "do-nothing" alternative essentially considers keeping the airport in its present condition and not providing for any type of improvement to the existing facilities. The primary result of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area.

The Chandler and Gilbert areas have experienced strong growth in all socioeconomic categories over the past several years. Forecasts provided by MAG indicate that this trend will likely continue throughout and beyond the long range planning horizon. This reason, combined with favorable regional and national aviation forecasts, demand potential for the Chandler Municipal Airport, and the analysis of facility requirements indicate a future need for improved facilities. Improvements recommended in the previous chapter include a longer runway, improvements to the taxiway system, improvement of navigational aids, and the construction of additional conventional and T-hangars. Without these facilities, regular users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities.

The unavoidable consequence of the "do nothing" alternative would involve the airport's inability to attract potential airport users. Corporate aviation plays a major role in the transportation of business leaders and key employees. Thus, an airport's facilities are often the first impression many corporate officials will have of the community. If the airport does not have the capability to meet hangar, apron, or airfield needs of potential users, the City's capabilities to attract the major sector businesses that rely on air transportation will be diminished. This holds true for general aviation users as well. The Phoenix area is served by a number of general aviation airports which provide similar services and facilities. High demand levels continue to be placed upon the

region's airports. If demand continues to grow, it will be critical that key airports, such as the Chandler Municipal Airport; will need to accommodate a portion of this growth to ensure that adequate capacity is available for the future.

The long-term consequences of the "do nothing" alternative extends beyond the immediate Chandler/Gilbert area. Chandler Municipal Airport is part of a system of public airports in Maricopa County that serve the aviation needs of the region. Without facilities such as Chandler Municipal Airport, Williams Gateway Airport, and Mesa-Falcon Field, commercial service airports like Phoenix Sky Harbor International would be at or exceeding capacity. General aviation airports not only provide convenience to general aviation users, but also help to avoid a major concentration of smaller general aviation aircraft and large commercial aircraft at a single airport.

An overall impact of this alternative will likely be the inability to attract certain businesses and industries seeking locations with adequate and convenient aviation facilities. Chandler Municipal Airport has much to offer in terms of airfield and landside facilities. Without regular maintenance and additional improvements, existing and potential users and business for Chandler Municipal Airport could be lost.

To propose no further development at Chandler Municipal Airport could adversely affect the long-term viability of the airport, resulting in negative economic affects on the community.

Therefore, the no development alternative is not considered prudent.

TRANSFER AVIATION SERVICES

The alternative of shifting aviation services to another existing airport was found an undesirable alternative due to the lack of available airports having the facilities or the potential that Chandler Municipal Airport provides the Chandler and Gilbert Communities. In 1996, Chandler Municipal Airport based 254 aircraft and experienced 156,209 total operations. There are only two public-use general aviation airports within twenty miles which could potentially serve the demand at Chandler Municipal Airport: Williams Gateway and Mesa-Falcon Field.

Currently, Mesa-Falcon Field bases approximately 522 aircraft and is supported by a parallel runway configuration. Runway 4R-22L provides the greatest runway length measuring 5,100 feet. This airport also maintains a lengthy hangar waiting list. Due to the numbers of based aircraft and aircraft operations at Chandler, the lack of existing facilities at Mesa-Falcon Field to meet the long range demand of based aircraft and operations, shifting services would not be possible without major development costs at Mesa-Falcon Field.

Williams Gateway Airport is being developed to serve the needs of large commercial jet aircraft as a reliever to Phoenix Sky Harbor. The re-use plan agreement specified that the airport

would not compete for general aviation aircraft and placed an ultimate general aviation aircraft allowance on future growth. Therefore, shifting general aviation demand from Chandler Municipal Airport to Williams Gateway would not be possible unless the non-competition agreement were annulled. If the agreement were to be annulled, however, Williams Gateway would not be capable of providing for the hangar requirements of the relocated aircraft without significant improvement costs. The location of Williams Gateway will allow each airport to serve a specific market niche. Williams Gateway will primarily serve commercial passenger and cargo aircraft, while Chandler Municipal Airport will serve the full range of general aviation aircraft activity.

Shifting demand to Memorial Airfield was also considered but rejected as a viable alternative. The airport is not currently open to the public and does not provide adequate facilities to serve a shift of even the existing demand at the Chandler Municipal Airport. Development costs associated with providing similar facilities would far exceed the benefits of the transfer.

Given these situations at these airports, current users of Chandler Municipal Airport would be forced to travel to more distant and far less convenient airports. Furthermore, the continuing growth expected by the major employers in the Chandler area as well as the infusion of new industries into the community demonstrates the need for a highly functional and convenient airport. General aviation airports play

a major role in the way companies conduct their business. Chandler Municipal Airport is expected to accommodate business aircraft traffic for companies located or conducting business in the Chandler and Gilbert areas. This role is not easily replaced by another existing airport in the system without tremendous expense.

CONSTRUCTION OF A NEW AIRPORT SITE

The alternative of developing an entirely new airport facility in the Chandler/Gilbert area to meet projected aviation demands was also considered, but similarly found to be an unacceptable alternative primarily due to the economic and environmental considerations. Land acquisition, site preparation and the construction of an entirely new airport near an urbanized area can be a very difficult and costly action. In addition, closing Chandler Municipal Airport would mean the loss of a substantial investment in a sizable transportation facility. In a situation where public funds are limited, the replacement of a functional and expandable airport facility would represent an unjustifiable loss of a significant public investment.

From the social, political, and environmental standpoints, the commitment of a new large land area must also be considered. The public sentiment toward new airports in the last few years has been very negative, primarily because a new airport normally requires the acquisition of

several large parcels of privately-owned property. Furthermore, the development of a new airport similar to Chandler Municipal Airport would likely take a minimum of over ten years to become a reality. The potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site. Also, given the fact the development space within the City of Chandler is limited, the commitment of a new large expanse of land may not be possible.

Overall, transferring service to an existing airport in the region or to an entirely new facility are unreasonable alternatives that should not be pursued. Chandler Municipal Airport is fully capable of accommodating the long term aviation demands of the area and should be developed in response to those demands. The airport has the potential to continue to develop as a quality general aviation airport that could greatly enhance the economic development of the community.

The previous chapter identified facilities necessary to meet the forecast demand throughout the planning period. The purpose of the remainder of this chapter is to evaluate alternatives that meet the needs of the airport. The necessary facilities and design concerns are examined in the paragraphs to follow.

AIRPORT DEVELOPMENT ALTERNATIVES

A commitment to remain at the existing site and develop facilities sufficient to

meet the long-range aviation demands entails the following requirements:

- Provide sufficient airside and landside capacity to meet the long range planning horizon level demand of the area.
- Develop the airport in accordance with the currently established FAA criteria.

The Facility Requirements Chapter outlined specific types and quantities of facilities necessary to meet projected aviation demands throughout the planning period. Expansion will be required to meet the long range planning horizon level of demand. The remainder of this chapter will describe various alternatives for the airfield and landside facilities. Before actual airfield and landside alternatives are presented, however, it is necessary to discuss items which are factored into the development of the various alternatives.

AIRFIELD ALTERNATIVE CONSIDERATIONS

The previous chapter indicated that the airport will be increasingly utilized by corporate aircraft throughout the planning period. The following paragraphs present discussion of alternative considerations given to specific airfield elements.

Runways

Analysis in the previous chapter indicated that the runway system

provides adequate length for small airplanes, but falls short of the requirements for the full range of business aircraft which could operate at the airport. Also, the previous chapter indicated that at least one runway at the airport should provide adequate length to accommodate these aircraft, while the parallel secondary runway should be designed to primarily accommodate operations by small aircraft and touch and go traffic. In order to accommodate 75 percent of corporate aircraft, FAA runway length design criteria requires 5,500 feet of runway. To fully accommodate 100 percent of business aircraft, the primary runway should be 6,800 feet in length. The secondary primary runway should be at least 4,300 feet long to accommodate 100 percent of small aircraft.

It should be noted, however, that an existing City Ordinance prohibits any runway at the airport from measuring greater than 4,850 feet long. The actual extension of any runway will require approval by the City Council and the amendment of the ordinance to allow for any proposed extension.

Consideration of alternative runway extension alternatives must also factor other design criteria established by the FAA. FAA design criteria regarding runway object free area (OFA), runway safety area (RSA), and height clearances must be considered.

The runway OFA is defined in FAA Advisory Circular 150/5300-13 Change 4, **Airport Design**, as an area centered on the runway extending out in accordance to the critical aircraft design

category utilizing the runway. The OFA must provide clearance of all ground based objects protruding above the runway safety area (RSA) edge elevation, unless the object is fixed by function serving air or ground navigation.

The RSA is also centered on the runway reaching out in accordance to the approach speed of the critical aircraft using the runway. FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

Analysis in the previous chapter indicated that the airport should be planned to accommodate aircraft in airport reference code (ARC) C/D-II. In order to meet design criteria for ARC C/D-II aircraft, the cleared and graded RSA would need to be 500 feet wide (centered on the runway) and extend 1,000 feet beyond each runway end. The OFA would require a cleared area 800 feet on each side of the runway centerline, extending 1,000 feet beyond each runway end.

Runway extension alternatives first considered Runway 4L-22R. The existing location of Runway 4L-22R would not readily allow the runway to provide adequate RSA and OFA for ARC C/D-II aircraft. The centerline of parallel Taxiway Alpha lies 240 feet northwest of the runway centerline. Thus, the taxiway would be within the RSA. FAA design criteria recommends that the parallel taxiway centerline lie at a minimum of 300 feet to the side of runway centerline. If the runway is to

be served by a precision approach, a taxiway-runway centerline separation of 400 foot is preferred.

The runway would not have adequate OFA clearance as well. The southernmost rows of T-hangars would lie within the OFA. If this runway were to be designed to serve ARC C/D-II aircraft, these facilities would need to be relocated in order to meet OFA design criteria.

The final consideration is obstruction clearance requirements established by Federal Aviation Regulations (F.A.R.) Part 77, **Objects Affecting Navigable Airspace**. F.A.R. Part 77 has been established to protect the airspace and approaches to each runway from hazards which could affect the safe and efficient operation of aircraft. These federal criteria have also been established for use by local jurisdictions in controlling the height of objects in the vicinity of the airport.

According to F.A.R. Part 77, the runway has a transitional surface that begins at the outside edge of the primary surface at the same elevation as the runway. The transitional surface rises at a slope of one foot vertically for each seven feet horizontal distance (7:1), up to a height which is 150 feet above the highest runway elevation.

The previous chapter indicated that the primary runway should be planned to provide for precision instrument approach minimums. This type of approach requires the primary surface to measure 1,000 feet in width. Part 77 requirements would preclude any

structures not fixed by navigational purposes from being located within 500 feet of either side of runway centerline. At that point, the transitional surface rises at a ratio of seven to one. Thus, a structure which is twenty foot high must lie at least 640 foot from runway centerline (if ground elevations are equal). This would require relocation (removal) of all but the furthest back row of T-hangars and much of the aircraft parking apron.

Because Runway 4L-22R cannot be readily upgraded to meet FAA design requirements, all reasonable runway extension alternatives involve Runway 4R-22L. Runway 4L-22R should be maintained for use by small aircraft and as the primary touch and go training runway.

Specific alternative extensions of Runway 4R-22L will be discussed in the next section. Before alternatives are presented, however, it should be noted that any extension to Runway 4R-22L would be somewhat restricted by the location of Queen Creek Road and Germann Road. Germann Road, however, is planned to be realigned in the future. This realignment plan will allow for additional runway length and is depicted on all airfield alternative exhibits in the following section.

Runway Protection Zone (RPZ)

The runway protection zone (RPZ) is a trapezoidal area centered on the runway typically beginning 200 feet beyond the runway end. The dimensions of the RPZ vary according to

the visibility minimums serving the runway and, in some instances, the type of aircraft operating on the runway. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses in order to enhance the protection of approaching aircraft as well as people and property on the ground.

The FAA does not necessarily require the fee simple acquisition of the RPZ area, but highly recommends that the airport have positive control over development within the RPZ. It is preferred that the airport own the property through fee simple acquisition, however, avigational easements (providing control of airspace within the RPZ) can be pursued if fee simple purchase is not possible. It should be noted, however, avigation easements can often cost as much as 80 percent of the land value and may not fully prohibit incompatible land uses from the RPZ. Also, the area encompassed by the RPZ envelopes the required RSA, OFA, and areas needed for installation of approach lighting systems, all of which would be required for purchase. In order to protect the transitional surfaces defined by F.A.R. Part 77, property 750 feet on either side of Runway 4R-22L should be acquired as well. For planning purposes, therefore, all alternative cost estimates will assume fee simple acquisition of the RPZ and land 750 feet on either side of the runway centerline not currently encompassed by the existing property line.

Taxiways

Each alternative will provide for two way taxi circulation on the airfield and in the terminal area in order to increase operational capacity and to enhance operational safety. Two-way circulation for the airfield will be provided by the extension of the partial parallel Taxiway Bravo running between the runways. Also, any extension of Runway 4R-22L will require additional exit taxiways.

Navigational Aids

The evolution of global positioning system (GPS) technology has provided an inexpensive alternative for airports such as Chandler Municipal Airport to be served by instrument approaches. Planning for a precision approach for the airport was recommended in the previous chapter.

Because of potential airspace conflicts with Williams Gateway Airport and Mesa-Falcon Field, a precision GPS approach from the south would be preferable. The primary runway should also provide for a non-precision approach from the north. The secondary parallel runway will be utilized primarily by training activity, thus, a precision instrument approach to this runway will not be planned.

Runway 4L is currently served by a VOR/GPS approach, while Runway 4R is served by a NDB approach. Typically, a VOR provides lower

approach minimums than the NDB. For this reason, the Runway 4R NDB approach maintains visibility minimums which are 1,000 feet greater than the VOR/GPS 4L approach.

It should be noted that the Salt River Project (SRP) will be constructing a series of power lines within a corridor northwest, west, southwest, south, and southeast of the airport. Consideration of a precision approach serving Runway 4R must factor these objects in order to determine if a CAT I approach would be possible.

In developing plans for the construction of the power line corridor, SRP also considered the potential airspace conflicts that the poles could have on existing approaches to the airport from the south. After review of a recent survey, an SRP representative indicated that two structures (a grain elevator and a water tower) existed in the approach surfaces of the runway. Airspace analysis of these structures concluded that the minimum descent altitude (MDA) should be raised by 20 feet for the existing straight-in approach to Runway 4L and 40 feet for the existing circling approach (Runway 4L). The FAA agreed with the analysis and raised the minimums for the existing approaches accordingly.

Because the Runway 4L threshold lies nearest the proposed power line corridor, airspace analysis of the existing Runway 4L approaches was conducted. Based upon the surveyed pole elevation information provided by SRP, the tallest transmission pole proposed within the primary area of the

straight-in approach to Runway 4L would be 140 feet. In order to meet FAA obstacle clearance criteria for the existing straight-in approach (250 foot obstacle clearance), the location of the tallest pole would require the MDA to be raised by an additional 40 feet. In order to meet FAA obstacle clearance for the existing circling approach for Runway 4L (300 foot obstacle clearance), the location of the pole would require an increase of the MDA by 40 feet as well. After review of SRP's airspace analysis, FAA agreed with the analysis and raised the minimums for these approaches accordingly.

If Chandler Municipal Airport were to be served by a GPS precision approach, the same criteria would need to be followed for Runway 4R. From information provided by the SRP, it appears that the poles would not obstruct a 50 to 1 approach if the glide slope angle for the approach was greater than two and three-quarters degrees. Currently, a three degree glide slope angle is standard, thus, the final approach would not be obstructed by the location of the poles. All alternatives provide a 34 to 1 approach to Runway 22L, while providing for a 50 to 1 approach to Runway 4R. Approaches to the parallel runway are planned for visual 20 to 1 approaches.

In order to implement a precision approach to Runway 4R providing CAT I minimums, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) would be required. The FAA requires a cleared 50 to 1 approach slope and that the airport maintains control the 400-

foot wide strip of land extending 2,400 feet from the runway end. If the airport owns all property within the runway protection zone (RPZ), this requirement will be met. FAA standards are set to ensure that the MALSR system is not obstructed to the pilots view while on final approach to the runway.

Aircraft Noise Considerations

Aircraft sound emissions are often the most noticeable environmental effect an airport will produce on the surrounding community. If the sound is sufficiently loud or frequent in occurrence it may interfere with various activities or otherwise be considered objectionable.

To determine the noise related impacts that each of the proposed development alternatives could have on the environment surrounding the Chandler Municipal Airport, noise exposure patterns were analyzed for projected operational levels of the long range period. Noise contours associated with each of the airfield alternatives will be compared with a baseline, or "no change" set of noise exposure contours. The "no change" scenario assumes that no extensions of the runway will occur and the airfield will be somewhat limited for use by the range of corporate aircraft types. The current length of the runway is somewhat limited for use by larger corporate aircraft, especially during the summer months.

The basic methodology employed to define aircraft noise levels involves the use of a mathematical model for aircraft noise prediction. The *Yearly Day-Night*

Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, the Environmental Protection Agency (EPA), and the Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility, meaning that the noise levels below the 65 DNL are considered compatible with all underlying land uses. Most federally funded airport noise studies utilize DNL as the primary metric for evaluating noise.

DNL is defined as the average A-weighted sound level as measured in decibels (dB) during a 24-hour period. A 10 dB penalty is applied to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL is a summation metric which allows objective analysis and can describe noise exposure comprehensively over a large area.

Since noise decreases at a consistent rate in all directions from a source, points of equal DNL noise levels are routinely indicated by means of a contour line. The various contour lines are then superimposed on a map of the airport and its environs. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not on the other. DNL calculations do not precisely define noise impacts. Nevertheless, DNL contours can be used to: (1) highlight existing or potential incompatibilities between an airport and any surrounding develop-

ment; (2) assess relative exposure levels; (3) assist in the preparation of airport environs land use plans; and (4) provide guidance in the development of land use control devices, such as zoning ordinances, subdivision regulations and building codes.

The noise contours for Chandler Municipal Airport were developed using the Integrated Noise Model (INM), Version 5.1. The INM is a computer model which accounts for each aircraft along flight tracks during an average 24-hour period. These flight tracks are coupled with separate tables contained in the data base of the INM which relate to noise, distances, and engine thrust for each make and model of aircraft type selected.

Discussions with airport and ATCT staff were utilized in developing aircraft fleet mix utilizing the airport, flight tracking information, runway utilization, and hours of aircraft operation. Also, forecasts of future aviation activity developed in **Chapter Two** were used as input in the noise model.

Once generated, the noise exposure contours for each airfield development alternative can be compared against the contour generated without changes made to the airfield. The contours for each development alternative can also be compared against other alternatives which could factor in determining the best choice for future airfield development.

AIRFIELD ALTERNATIVE A

Alternative A, depicted on **Exhibit 4A**, proposes the extension and widening of Runway 4R-22L to 6,800 feet by 100 feet. Under this alternative, the proposed 1,950 foot runway extension is accommodated with a 250 foot extension on the south end of the runway and a 1,700 foot extension to the north end. This alternative is designed to maintain the OFA and RSA within current airport boundaries to the south.

As depicted on the exhibit, a 250 foot extension to the south is the maximum that can be accommodated without relocating Queen Creek Road. In order to maintain adequate runway OFA and RSA for the north end of the runway, Germann Road would need to be rerouted further than the currently planned and accepted realignment plan. The current realignment plan and the modification of Germann Road required by Alternative A are both depicted on **Exhibit 4A**. This modification would result in an additional right-of-way and construction cost of approximately \$1.0 million. It would also require renegotiation of the right-of-way with affected land owners.

In order to extend the runway and maintain positive control of areas within the RPZ's and sideline clearances, 113 acres of property would need to be purchased.

Taxiway improvements are also depicted on the exhibit. The major taxiway improvements include the extension of partial parallel Taxiway B and full length parallel Taxiway C to the proposed ends of Runway 4R-22L. The extension of Taxiway B would then allow it to serve as a full length parallel taxiway for both runways, thus,

improving two-way airfield traffic circulation. Additional entrance/exit taxiways are provided to the proposed ends of Runway 4R-22L. The total cost associated with this alternative is estimated at approximately \$13.7 million. A breakdown of specific cost estimates is provided in **Table 4A**.

TABLE 4A				
Alternative Cost Summary Chandler Municipal Airport				
	ALTERNATIVE			
	A	B	C	D
Extend/Widen Runway 4L-22R	\$2,520,000	\$2,520,000	\$2,315,000	\$2,710,000
Extend Taxiway B - South	1,015,000	1,115,000	1,015,000	1,115,000
Extend Taxiway B - North	635,000	560,000	560,000	635,000
Extend Taxiway C	825,000	825,000	765,000	895,000
Land Acquisition	\$7,800,000	\$7,590,000	\$7,037,000	\$7,245,000
Additional Germann Realignment	\$1,000,000 N/A	N/A \$1,625,000	N/A N/A	N/A N/A
Reroute Queen Creek Road				
TOTAL COST	\$13,795,000	\$14,235,000	\$11,692,000	\$12,600,000

Another consideration which must be addressed is the expected noise exposure with regards to the runway extension. **Exhibit 4B** compares noise generated by the alternative to a baseline condition (no runway extension). The baseline contours take into account the limitations that the current runway would have on operations by business aircraft. This can then be compared to any change in aircraft fleet mix that would be created by the extension alternative.

Advantages: The runway extension allows the airport to serve the range of corporate aircraft expected to operate in

the Chandler area. Also, the extension of Taxiway B increases operational efficiency and safety by providing two-way airfield circulation.

Disadvantages: The northerly portion of the runway extension would require modification of the planned Germann Road realignment. It is likely that the costs and timeframe associated with further reconfiguration of Germann Road would make implementation of this alternative financially infeasible unless the project is held up to accommodate the additional runway length.

AIRFIELD ALTERNATIVE B

Depicted on **Exhibit 4C**, Airfield Alternative B also proposes a 1,950 foot runway extension. As illustrated on the exhibit, the extension is accommodated with a 1,450 foot northerly extension and a 500 foot southerly extension. As with the previous alternative, the runway would be widened to 100 feet. This alternative maintains the RSA and the OFA within the currently approved Germann Road realignment.

As illustrated on the exhibit, the RSA and OFA for the north end of the runway are maintained inside the Germann Road realignment. Planning the remaining length to the south would require Queen Creek to be realigned. This realignment of Queen Creek Road is illustrated on the exhibit. The fee simple acquisition of the RPZ's and sideline clearances would include 110 acres.

Taxiway improvements depicted on **Exhibit 4C** are similar to the previous alternative. Taxiways B and C are extended the full length of Runway 4R-22L. The total cost associated with improvements proposed by Airfield Alternative B is estimated at \$14.2 million.

As with the previous alternative, noise contours were generated considering the projected operational levels and runway extension. These contours can be compared to the baseline condition contours as illustrated on **Exhibit 4D**.

Advantages: The runway extension proposed by this alternative allows the

runway to adequately serve the full range of corporate aircraft expected to utilize the airport without impacting the planned Germann Road Realignment. Taxiway circulation is improved with the extension of Taxiways B and C.

Disadvantages: The only notable disadvantage associated with this alternative is the required relocation of Queen Creek Road.

AIRFIELD ALTERNATIVE C

The approach taken in Airfield Alternative C differs from the previous alternatives. The proposed runway extension for this alternative is designed to be kept within the constraints of Germann Road (after realignment) and Queen Creek Road. In order to allow for the required RSA and OFA off each end of the runway without impacting either roadway, the runway can be extended 1,700 feet. As illustrated on **Exhibit 4E**, a 250 foot southerly extension and a 1,450 foot northerly extension would be the maximum possible within these constraints. This would provide a total length of 6,550 feet.

Although the runway ends would fall within airport property, additional property would need to be acquired for the RPZ's and transitional surfaces. Approximately 102 acres of land would need to be acquired to maintain positive control of these areas.

Taxiway improvements include the extension of Taxiway B and the

extension of Taxiway C. The cost of improvements proposed in Airfield Alternative C is estimated to be \$11.7 million.

A comparison of expected noise exposure for this alternative and the baseline condition is depicted on **Exhibit 4F**.

Advantages: The runway extension proposed by Airfield Alternative C does not impact Queen Creek or Germann Roads (after the planned Germann Road realignment occurs). Taxiway improvements provide increased efficiency of circulation.

Disadvantages: The 6,550 foot length is 250 feet short of the design length. The result would be more restrictions on aircraft operating capabilities during warm weather days three months out of the year.

AIRFIELD ALTERNATIVE D

Similar to the previous alternative, Airfield Alternative D utilizes Germann and Queen Creek Roads as constraints to future runway length. In this scenario, however, the useable runway take-off length of 6,800 feet required by 100 percent of corporate aircraft is met through displacing the landing thresholds and applying declared distances.

Declared distances are the effective runway distances that the airport operator declares are available for take-off run, take-off distance, accelerate-stop distance, and landing distance

requirements. These are defined by the FAA as:

Take-off run available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors.

Take-off distance available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off to start of take-off climb, plus safety factors.

Accelerate-stop distance available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors.

Landing distance available (LDA) - The distance from threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

The ASDA and LDA are the overriding considerations in determining the runway length available for use by aircraft because safety areas must be considered. The ASDA and LDA can be figured as the useable portions of the runway minus the area required to maintain adequate RSA and OFA beyond the end of the runway.

As depicted on **Exhibit 4G**, Airfield Alternative D proposes an actual pavement extension of 1,700 feet to the north and 500 feet to the south. The exhibit also illustrates the displacement, or shift of the landing

threshold from the pavement end by 250 feet on each end of the runway. Under this scenario, the ASDA for each end of the runway would equal 6,800 feet, while the LDA would equal 6,550 feet. Because each end of the runway is displaced, the full required RSA and OFA is provided within the boundaries of Queen Creek and Germann Roads (after the Germann Road realignment plan occurs).

Although the runway ends would fall within airport property, additional property would need to be acquired for the RPZ's. Approximately 41 acres of land would need to be acquired to the north. The fee simple acquisition of the RPZ area to the south would require purchase of approximately 37 acres. Acquisition of 27 acres would be required for positive control of the transitional surfaces.

Similar to the previous alternatives, Taxiways B and C are extended the full length of the runway. The cost of implementing all improvements associated with Airfield Alternative D is estimated at \$12.6 million.

As with the previous alternative, noise contours were generated considering the projected operational levels and runway extension. These contours can be compared to the "do nothing" alternative contours as illustrated on **Exhibit 4H**.

Advantages: Airfield Alternative D is the only proposed alternative which provides adequate length for the runway take-off needs of 100 percent of corporate aircraft without disturbing

either Germann or Queen Creek Roads. Taxiway circulation provides increased safety and efficiency.

Disadvantages: Although the take-off length needs are accommodated, only 6,550 feet of runway is available for landings. Landing length requirements, however, are generally much less than take-off length requirements.

LANDSIDE ALTERNATIVE CONSIDERATIONS

Terminal Area

The orderly development of the airport terminal area can be the most critical, and probably the most difficult development to control on the airport. A terminal area development approach of taking the path of least resistance can have a significant effect on the long term viability of an airport. Allowing development without regard to a functional plan could result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of the valuable space along the flight line.

Activity in the terminal area can be divided into three areas at Chandler Municipal Airport. The high activity area is the area providing aviation services on the airport. The aircraft parking apron provides for outside storage of aircraft and circulation of aircraft. In addition, large conventional hangars housing corporate aviation departments or storing a large number of aircraft would be considered a high

activity use. A conventional hangar structure in the high activity area should be a minimum of 10,000 square feet. The best location for high activity areas is along the flight line near midfield for ease of access to all areas of the airfield.

The medium activity use defines the next level of airport use and primarily includes smaller corporate aircraft that may desire their own conventional hangar storage on the airport. A conventional hangar structure in the medium activity use area should be at least 50 by 50 feet or a minimum of 2,500 square feet. The best location for medium activity use is off the immediate flight line but readily accessible. Parking and utilities such as water and sewer should also be provided in this area.

Low activity use defines the area for storage of smaller single and twin engine aircraft. Low activity users are personal or small business aircraft owners who prefer individual space in shade or T-hangars for aircraft storage. Low activity area should be located in less conspicuous areas. This use category will require electricity but generally does not require water or sewer utilities.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first class appearance to Chandler Municipal Airport. Consideration to aesthetics should be given to the entryway as well as public areas when arranging the various activity areas.

The existing terminal area at Chandler Municipal Airport has been developed according to separation of activity levels. The recently constructed terminal building lies approximately in the middle of the terminal area. The FBO's (high activity level) are located in the northern portion of the terminal area, while shade and T-hangar facilities (low activity levels) have been constructed on the south side of the terminal area.

Although the current configuration of terminal facilities provides adequate separation of activity levels, the layout of FBO facilities in the terminal area is somewhat haphazard. The existing FBO hangar facilities were constructed facing the south. Also, two conventional hangars (Venture Aviation and a secondary hangar owned by Chandler Air Service) lie to the north (behind) of the terminal building, Chandler Aviation, and Chandler Air Service.

Ideally, terminal area facilities at general aviation airports should follow a linear configuration parallel the primary runway. The linear configuration allows for greater depth maximizing space available for aircraft parking apron while providing ease of access to terminal facilities from the airfield. For these reasons, the previous ALP update depicted a reconfiguration of the FBO facilities. In order to provide greater depth of ramp, the reconfiguration plan depicted the FBO facilities moved to the north while turning the facilities so they lie parallel the runway configuration. In fact, the terminal building was recently constructed so it would be consistent

with a linear configuration. Also, the City has incorporated the roadway access plan for the reconfiguration within its future plan. The roadway access plan would allow for direct access to the terminal area from Cooper Road. It is also planned that Cooper Road will be served by an interchange from the SANTAN Freeway, thus providing the airport regional access.

Initial analysis of landside development potential indicates that the existing terminal area should continue to be developed to serve the needs of local aircraft activity. Also, the City has paved taxilanes for construction of additional T-hangars southwest of the existing T-hangar facilities. This area will provide for approximately 70 additional T-hangar units.

Ultimately, if the airport is to better serve larger corporate aircraft, construction of facilities to serve them could be provided on the southeast side of the airfield. Facilities typically needed for these aircraft include large conventional and corporate hangars and aircraft parking apron. Development of the south side, thus, will provide for better separation of business and individually owned aircraft. The City can provide parceled areas so that corporate operators can develop individual parcels in a manner which fits the specific needs of their operation.

Each landside alternative will separately address development issues of the north side and the south side of the airport. Separation of activity levels and efficiency of layout will be provided as well.

Air Traffic Control Tower (ATCT)

As mentioned in the previous chapter, the Chandler Municipal Airport is currently served by a temporary ATCT located south of Runway 4R-22L, on Taxiway L3. Analysis of facility requirements indicated the need for a permanent ATCT at the airport. Under separate study, the permanent location of an ATCT has been determined utilizing FAA ATCT siting criteria. The selected site is depicted on each of the landside alternative exhibits.

LANDSIDE ALTERNATIVE A

Landside development proposed in this alternative utilized the previous terminal development plan as a reference. As illustrated on **Exhibit 4J**, the existing area surrounding the terminal building would be reconfigured providing for increased aircraft parking apron space and improves land use efficiency. The reconfiguration plan would also include the construction of a roadway running from Airport Boulevard to Germann Road. Additional access roads running north/south between Germann Road and the new terminal access road would be included.

Immediately south of the proposed terminal access road is the location of aviation related development parcels. These parcels would be reserved for FBO and corporate operators. In order to implement this alternative, approximately 14 acres of land would need to be purchased at an estimated cost of \$970,000. The development of

these parcels would also require closing Ryan Road, thus, closing the only access roadway to the general aviation terminal building. A new access road running through the parking lot which served the previous terminal building would need to be constructed. As depicted on the exhibit, the road would run east through the existing parking lot, then turn northeast back to the terminal building. Automobile parking is provide on the east, north, and west sides of the terminal building.

It should be noted that the reconfiguration of the terminal area would require the relocation of the existing FBO's. If this plan were to be completed in the short term, it is likely that the City would need to buy out the leaseholds before the relocation of facilities could take place. Long term strategy, however, could allow for each lease to expire, then relocate the facilities at that time.

The remaining development included on the north side of the runway system is the construction of an ATCT adjacent to the old terminal building parking lot and the construction of additional T-hangars south of the existing rows of T-hangars.

Also depicted on **Exhibit 4J**, is the development of aviation facilities on the south side of the runway system. As illustrated, executive hangar expansion is grouped on the northeast side, T-hangar facilities are developed to the southwest of the executive hangars, and FBO/corporate parcels span from the middle to the southern end of Runway 4R-22L. It is envisioned that the south side development would be geared to

accommodating corporate type aircraft and operators. An access road would provide automobile access to the development areas. The inclusion of a taxiway leading from Taxiway C south to the edge of the property line provides for future access of the airfield by industrial/corporate parcels planned for the area.

Cost estimates were calculated for the construction of the terminal area access roadways. **Table 4B** provides cost estimates for roadway and land acquisition proposed by each alternative.

Advantages: The reconfiguration of the existing terminal facilities allows the north side of the runway to provide for additional aircraft parking apron and provides increased land use efficiency. Future construction maintains good separation of activity levels. All facilities required to meet the aviation demands of the long range planning horizon are accommodated. Staging of this alternative could provide advantages, by first constructing the easterly portion in the short term.

Disadvantages: Reconfiguration of the existing terminal area would be extremely costly. If the plan were developed in the short term, leases may need to be purchased and buildings relocated. The long term plan of waiting for leases to expire would be less costly, however, the relocation of the facilities may likely exceed the perceived benefit of the reconfiguration.

The size of the apron area could create traffic control problems.

TABLE 4B**Landside Alternative Cost Estimates
Chandler Municipal Airport**

	ALTERNATIVE		
	A	B	C
Roadway Improvements			
North	\$2,443,000	\$3,321,000	\$0
South	2,080,000	1,728,000	1,793,000
Land Acquisition Required	\$966,000	\$1,449,000	\$0
TOTAL COST	\$5,489,000	\$6,498,000	\$1,793,000

LANDSIDE ALTERNATIVE B

Similar to the previous alternative, Landside Alternative B proposes development north of existing Ryan Road. This plan, however, would not disturb the location of the existing FBO facilities. This alternative extends dual-access taxiways behind (north) of the FBO's to areas parceled for corporate/industrial use. Approximately 21 acres would need to be acquired for development of the parcels.

In order to provide automobile access to the industrial/commercial and corporate parcels, a terminal access road would need to be developed as illustrated on **Exhibit 4K**. The proposed roadway runs from Airport Boulevard, north of Ryan Road, extending to Germann Road. Roads running south from the proposed terminal access road would provide access to the parcels, existing FBO facilities, and the general aviation terminal building. Roadway improvements for the north side are estimated to cost \$3.3 million.

As with the previous alternative, the construction of T-hangars south of existing T-hangars, as well as the construction of a permanent ATCT is included in this alternative.

Development of aviation facilities on the south side of the runways include the construction of T-hangars parallel and south of the Runway 4R threshold, executive hangars immediately north of the T-hangar facilities, and FBO/corporate parcels approximately midfield. Running between the FBO parcels is a taxiway leading south from Taxiway C to the southern edge of airport property. This taxiway is designed to serve industrial/commercial parcels south of airport property wishing to maintain airfield access. A roadway system developed off of Cooper Road provides automobile access to all development areas. The roadway system proposed for the south side development area is estimated to cost \$1.7 million.

Advantages: This alternative does not require the reconfiguration of existing facilities, thus, would be less costly. The location of the proposed terminal access roadway running parallel and south of Germann Road would provide a buffer or separation of aviation and non-aviation use parcels. After implementation of this alternative, landside facilities are capable of accommodating long range demand levels.

Disadvantages: The layout of the existing FBO facilities does not allow for the best utilization of existing space. The proposed apron expansion on the north side of the runway system may become undersized in the short term requiring additional apron to be built on the south side of the runway system well before it would be needed in the previous alternative.

LANDSIDE ALTERNATIVE C

The approach taken on Landside Alternative C was to maintain the existing terminal area to serve the needs of small general aviation type aircraft, while providing facilities on the south side of the airfield which would accommodate larger, corporate type aircraft. As depicted on **Exhibit 4L**, this alternative would develop T-hangar facilities immediately north of Ryan Road behind the existing terminal area. As with the previous alternatives, the permanent location of the ATCT is indicated as well as the construction of additional T-hangar facilities west of the existing T-hangars. Apron expansion on the east end of the

existing aircraft parking apron is also depicted.

As indicated above, the south side of the airport would be designed to accommodate larger corporate type aircraft. Executive hangars are shown to the south, while FBO/corporate parcels are proposed to the north. A taxiway leading from Taxiway Charlie to the edge of airport property would allow for airfield access to planned industrial/commercial parcels just off of airport property.

Advantages: This alternative does not require the reconfiguration of existing facilities, the purchasing of additional property for parcel development, or the construction of a new terminal access roadway, thus, would be less costly. Once implemented, this alternative provides landside facilities capable of accommodating long range demand levels.

Disadvantages: The layout of the existing FBO facilities does not allow for the best utilization of existing space. The proposed apron expansion on the north side of the runway system may become undersized in the short term requiring additional apron to be built on the south side of the runway system well before it would be needed in Alternative A.

SUMMARY

The process utilized in assessing the airside and landside development alternatives involved a detailed analysis of short and long term require-

ments as well as future growth potential. Current airport design standards were considered at every stage of development. Safety, both air and ground, were given a high priority in the analysis of alternatives.

After review and input from the Planning Advisory Committee, City officials, and the public, a recommended concept will be developed by the consultant. The resultant plan will represent an airside facility that fulfills safety design standards, and a landside complex that can be developed as

demand dictates. The development plan for Chandler Municipal Airport must represent a means by which the airport can evolve in a balanced manner, both on the airside and landside, to accommodate the forecast demand. In addition, the plan must provide for flexibility to meet activity growth beyond the long range planning horizon.

The following chapters will be dedicated to refining the basic concept into a final plan with recommendations to ensure proper implementation and timing for a demand-based program.